Corporate use

Luxembourg, *28 November 2018*

Operation No.: *2015-0021*

PROJECT COMPLETION REPORT

TŰBİTAK Research Promotion II

Turkey

TABLE OF CONTENTS

Disclaimer:

The financing for this project benefits from an EU guarantee to the Bank under DECISION No 466/2014/EU of the European Parliament and of the Council. Pursuant to Article 9 (2) of this Decision, the Bank "shall require the project promoters to carry out thorough monitoring during project implementation until completion, inter alia, on the economic, development, social, environmental and human rights impact of the investment project. The EIB shall verify on a regular basis the information provided by the project promoters and make it publicly available if the project promoter agrees. Where possible, project completion reports related to EIB financing operations shall be published excluding confidential information."

The information and views presented in this document are the EIB's and do not necessarily reflect the views of the promoter and/or any other third party. Confidential information contained in this document has been removed in accordance with the EIB Group Transparency Policy.

Scope

a. Project Description

The project concerned the Research and Development (R&D) activities supported by the Academic Research Funding Programmes Directorate (ARDEB) and the Technology and Innovation Funding Programmes Department (TEYDEB), implemented through the Scientific and Technological Research Council (TÜBİTAK) in order to strengthen the R&D and innovation capacity in Turkey. The project was the Bank's fifth in a continuing programme supporting the development of the Turkish Research Area and its integration into the European Research Area. This lending programme was launched once the accession chapter on science and research had been closed in 2006.

The aim of ARDEB is to support research projects targeting the creation of new scientific knowledge and solutions to existing technological problems in order to increase Turkey's competitiveness. Started in 1994, it has become one of the major programmes to meet national targets in science, technology and innovation. All companies, scientists/researchers, higher education institutions' research units, other non-profit research organisations, higher education institutions and non-profit technology and innovation centres are eligible for such support. Beneficiaries are mainly from the universities and research institutes. While the private sector can also apply, the programme is widely known as academic research support scheme. Finance in the mode of grants is available through the programme. For 2018, the upper limit for project support is approximately EUR 158 800[1] per year. Maximum duration for projects is 36 months. There are three calls for proposals during the year.

The aim of TEYDEB is to help improve the capability of manufacturing and software companies to carry out R&D projects and therefore increase R&D activities in the private sector. The only group eligible for support is the private sector companies. Mode of finance is grant for the projects supported under this programme. The amount of support is determined depending upon the size of the company, education levels of the project's personnel, the percentage of revenue from the products developed by the company, collaboration with a university or a research centre, and whether the project is in one of the priority areas. Eligible costs under the scheme are as follows: labour costs, equipment and materials, training, external expertise and patenting. Maximum project duration for support is 36 months.

b. Implementation and Operation

The project was implemented by TÜBİTAK as indicated at appraisal.

The institutional structure of the Turkish innovation system remains highly centralised. The Supreme Council for Science and Technology (SCST) is the highest science and technology policy-making and coordination body in Turkey. Established in 1983, the SCST is legally responsible of determining, directing and coordinating science and technology policies. The SCST proposes policies and decides on policies designed by the TÜBİTAK; approves the action plan to implement policies; assigns the responsible bodies and coordinators for each policy, and follows and coordinates implementation of policy action.

On the operational level, TÜBİTAK is the public agency responsible for managing the implementation of national science and technology policies and the effective functioning of the Turkish Research Area. It is also responsible for managing the competitive allocation of national research funding. Its main tools for achieving this are the organisation of calls for tender for the ARDEB and TEYDEB programmes and their affiliated schemes, the screening of project applications, the selection and funding of successful R&D projects, and the monitoring and evaluation of these projects.

Since 2004, TÜBİTAK has adopted an independent panel-based proposal review process to evaluate the proposals received from academia, private and public sectors to the ARDEB programme. To apply to TEYDEB, companies prepare a project proposal. Once the proposal is received, it is sent by TEYDEB to the related technology group and an expert is assigned to the project. Then TEYDEB appoints academics from universities to assess the project. Each academic assesses the project independently and prepares a report about the eligibility of the project. The reports are then assessed by the sectoral boards with TEYDEB and decision for support is given by this board.

c. Promoter name: The Scientific and Technological Research Council - TÜBİTAK (*Türkiye Bilimsel ve Teknolojik Araştırma Kurumu)*

Link to Website: https://www.tubitak.gov.tr/

Cost and Schedule

a. Investment Cost at Appraisal and Completion

At appraisal, the total project investment was estimated at EUR 535.1 m. The cost of research administration (TÜBİTAK institutional overhead cost and other) –estimated at 10% of the promoter's base case – is excluded from the project definition. The EIB project definition does not include the Defence and Security Technologies grants.

The promoter reports the realised investment cost of EUR 486 m at completion. The share of the EIB loan slightly increased from 37% to 41%.

b. Schedule

The project was implemented as foreseen at appraisal in 2015 and 2016.

Performance

a. Market aspects

Turkey is a large, fast growing, middle-income economy. Following a strong recovery in 2017 and turbulence in spring 2018, economic growth is expected to slow down and to stay at 3.8% in 2018 and 2.3% in 2019, as stated in the new Medium-Term Economic Programme unveiled in September 2018.[1] Turkey has shifted from an economy largely based on agriculture and textiles towards an industrial economy. Rebalancing the economy, while keeping up growth, calls for improved export performance. This requires productivity and competitiveness gains in the business sector. In Turkey, firms have successfully diversified into new sectors and export markets over the past decade but their relatively thin human capital base and very fragmented structure hold back further progress. Promoting economic growth and international competitiveness through strategic actions in support of the knowledge economy is the stated goal of the national development plan.

Turkey has made great strides in building up its Science, Technology and Innovation (STI) capacities and has been pursuing the vigorous expansion of R&D which began in the early 2000s. The gross expenditure on R&D (GERD) in the country has been consistently increasing over the years and has tripled in a decade (in terms of 2018 constant prices). The business expenditure on R&D (BERD) has also been steadily increasing. An upward trend can be depicted for the number of full-time equivalent (FTE) R&D personnel which has increased, albeit from a very low human resource base, to 137 000 in 2016. The government remains committed to sustained investment in STI. According to the National Science, Technology and Innovation Strategy (2011-2016) approved on 5 December 2010, 2023 development targets are identified such as achieving a GERD/GDP ratio of 3% and a BERD/GDP ratio of 2%, raising the number of full-time equivalent (FTE) researchers to 300 000, and the number of FTE researchers in business to 180 000, by the time the Republic celebrates its centenary in 2023.

While Turkey's public and private R&D expenditures are growing substantially and its R&D gap with other emerging economies is narrowing, a key issue is how effectively R&D expenditures are being translated into innovation and productivity gains. Aggregate indicators of innovation and technology performance suggest that Turkey may still lag behind its peers. Around only 3.52% of Turkey's manufactured exports are high-tech in 2016.[2] Data from to the European Innovation Scoreboard that monitors the innovation performance of the EU-28 countries plus nine OECD economies show that, in 2017, Turkey was ranked 28th, better than Bulgaria, Croatia and Romania but lagging behind the other EU countries.[3]

[1] The new Medium-Term Economic Programme was published on 20 September 2018 in the Official Journal: http://www.resmigazete.gov.tr/eskiler/2018/09/20180920M2.pdf

[2] Detailed data can be found in the 2016 release of the Turkish Statistical Institute on international trade: http://tuik.gov.tr/PreTablo.do?alt_id=1046

[3] Detailed information can be found in the 2018 edition of the European Innovation Scoreboard: https://ec.europa.eu/growth/industry/innovation/facts-figures/scoreboards_en

Limited collaboration between public research institutes, universities and the enterprise sector contributes to the low productivity of Turkey's innovation system. Despite progress, on average, only 10.4% of innovating SMEs and 21.6% of innovating large firms develop their innovations in collaboration with universities or research institutions.[4] Innovation and technology diffusion need to be supported by mechanisms that deliver strong education and skills. Yet, the scarcity of human capital remains another critical bottleneck for the R&D investments in Turkey. Turkey's higher education degree attainment rate for the population aged 30-34 stands at 27.3%, which is among the lowest across EU-28 countries where the average is 39.9%.[5] One of the main reasons for this scarcity is a brain-drain that claims a significant share of Turkish researchers who reside abroad upon completion of their PhDs.

b. Financial and Economic aspects

Strategic investments in R&D and innovation can be critical factors for enhancing productivity gains that underpin competitiveness, growth and employment generation. R&D can increase productivity by improving the quality or lowering the average production costs of existing goods or simply by widening the spectrum of final goods or intermediate inputs available. Moreover, R&D investments carried out in one firm, sector and country may produce positive spill-over effects in other firms, sectors and countries.

Although there is no formal ex-post assessment of the economic rate of return undertaken by the Bank, experience in similar programmes suggest that the economic returns through productivity growth accruing from R&D and innovation investments are substantial. These investments yield positive private returns, usually much higher than that to ordinary capital investments. As to social rates of return, they are substantially larger than the private returns. In the medium- to long-term, investment by the EIB in developing Turkey's R&D capacity will improve the economy's competitiveness and growth, enhancing skills and innovation and generating additional better quality jobs and other positive outcomes.

c. Project results (Output and outcomes)

The project was consistent with EU policies. It was also in line with EIB priorities as well as national needs. The loan was directly relevant to the Turkish national development strategy concerning the emerging industrial and knowledge economy. The project supplemented national sources of funding for R&D and provided additional blending of resources for R&D investment and support for public-private-university collaboration.

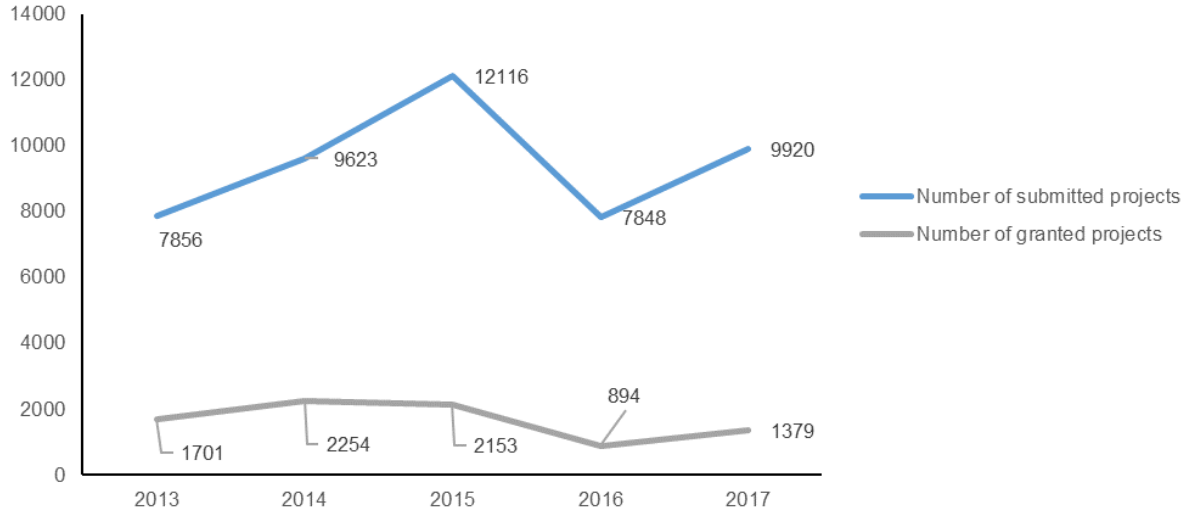
Many outputs and outcomes were achieved at project level. The project covered different activities to ensure the needs of various user groups (business and scientific community) were met. Yearly data on the number of academic R&D projects supported during 2013-2017 are given below in Figure 1. The number of projects applied and supported by ARDEB as of December 2017 are 9 882 and 1 373, respectively. The programme showed a rapid and strong growth in 2013-2015. However, it should be noted that, both number of projects submitted to and supported by ARDEB substantially decreased between 2015 and 2016 before increasing again in 2017.

A similar trend is observed with TEYDEB, as shown in Figure 2. After a strong growth between 2013 and 2015, the number of project proposals and granted projects decreased between 2015 and 2016, and started to increase gain in 2017.

[4] Detailed data can be found on the 2017 edition of the OECD Science, Technology and Industry Scoreboard (Page: 134):
https://www.oecd-ilibrary.org/docserver/9789264268821-en.pdf?expires=1540294196&id=id&accname=guest&checksum=3EC4BD32CFE18948026C1A4F777110B3

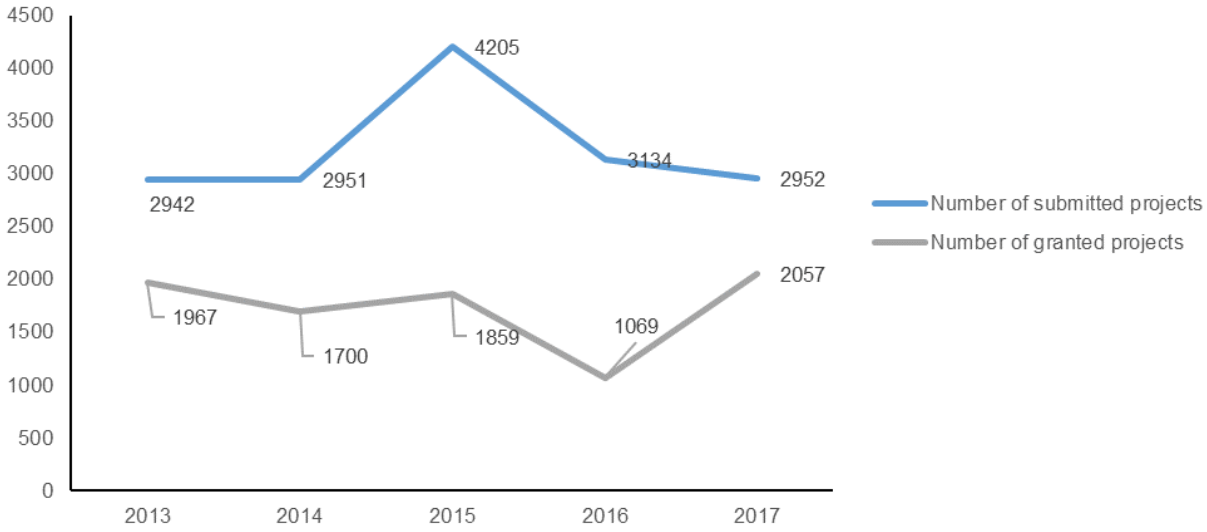
[5] More detailed data can be found on Eurostat:
https://ec.europa.eu/eurostat/statistics-explained/index.php/Tertiary_education_statistics

Figure 1: General statistics on ARDEB Projects



Source: Based on data provided by TÜBİTAK.

Figure 2: General statistics on TEYDEB Industrial R&D and Innovation Projects*



Note: * For 1 501, 1 507, 1 509, 1 511, 1 512 programmes.
Source: Based on data provided by TÜBİTAK.

Turkey's performance against aggregated strategic R&D indicators has shown a consistently upward trend over the last decade. GERD as a percentage of GPD has increased from 0.56% in 2006 to 0.94% in 2016. In the meantime, business has steadily overtaken the government as the leading sector to fund R&D at 46.7%. BERD as a percentage of GDP doubled over the last decade from 0.21% in 2006 to 0.51% in 2016. The number of FTE R&D personnel in the private sector steadily increased since 2006 from 18 029 to 72 579, outperforming the higher education sector. While there was an increasing trend over the last decade, the number of FTE R&D personnel in the government sector slightly decreased from 12 328 to 11 799 between 2015 and 2016.[6]

Yet, despite these increases and strong political will, Turkey's R&D investment remains well below the corresponding ratios recorded across OECD and EU-28 countries, 2.35% and 1.94%, respectively. Turkey's public research system, as measured by public R&D expenditure per GDP, is rather small (0.5%). Moreover,

[6] Detailed statistics on R&D in Turkey can be found on the Turkish Statistical Institute database: http://tuik.gov.tr/PreTablo.do?alt_id=1082

Turkey's rankings in qualitative international comparisons tend not to match its ambitions. Turkey produces few international publications in top scholarly journals as per OECD standards: only 4.4% of publications were among the 10% most cited in 2015 with a decrease from 5.6% in 2005.[7]

d. Environmental and social risks and mitigants

There were no significant environmental and social risks observed at appraisal.

EIB Involvement

a. Environmental and social conditions and undertakings, if applicable

N/A. There were no environmental and social conditions and undertakings.

b. Bank's involvement

The Bank financed the development of the Turkish Research Area for over a decade. Significant policy advisory services were provided in the early stages of the programme. The main EIB contribution, however, was not technical but financial. The previous loans were agreed against the backdrop of the financial and economic crisis and constraints on the Government's budget, and helped to alleviate these to an extent. The financial value added of the EIB loans has been significant. The previous loans led to a high level of blending of EIB, EU and Turkish resources for R&D. Moreover, they supported the combination of tangible and intangible investments in R&D and facilitated the collaboration between private and public actors, including the universities.

c. Sources of information for the PCR

This completion report relies on information provided regularly by the Promoter to the EIB, R&D data published on Turkish Statistical Institute (TŰRKSTAT) website, R&D and Innovation data published on OECD, EUROSTAT and UNESCO Institute of Statistics website and country progress reports published on the European Commission website.

ESCS

The Environmental and Social Completion Sheet (ESCS) has been published separately.

Promoter's Optional Final Comment

N/A.

[7] Detailed data can be found on the 2017 edition of the OECD Science, Technology and Industry Scoreboard (Page: 122):
https://www.oecd-ilibrary.org/docserver/9789264268821-en.pdf?expires=1540294196&id=id&accname=guest&checksum=3EC4BD32CFE18948026C1A4F777110B3